



The impact of digital transformation on talent management

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ABSTRACT

The digital transformation of companies involves a set of substantial changes in all areas of the organization. This study analyses the influence of digital transformation on talent management processes. In an effort to determine whether companies make different investments in each, we analyse talent management by separating the variables that attract and retain talent. The sample under study is made up of 314 Spanish companies who are currently undergoing the process of digital transformation. Company data were obtained through a questionnaire answered by managers of these organizations. The statistical technique used to test the model assumptions was a structural equation model. The results obtained lead us to accept the model hypotheses. The organizational changes brought about by digital transformation are thus seen to influence talent management and to attract and retain talent.

1. Introduction

Companies as well as society at large are currently in the process of digital transformation, which affects all types of activity, whether business or otherwise (Morakanyane et al., 2020). This process conditions companies globally –not only in terms of their internal operations or processes. Adapting to increasingly digital environments is a complex challenge for all companies and involves a change in the way work is done that has significant implications for organizational behaviour, corporate culture, talent recruitment and leadership tactics (Kane et al., 2017).

The potential benefits of digitization are manifold and include increases in sales or productivity, innovations in value creation, as well as new ways of interacting with customers (Berman, 2012). In many cases, business models need to be reformed or replaced (Downes and Nunes, 2013), since without profound changes in companies challenges cannot be solved sustainably (Bican and Brem, 2020). Digital transformation generally involves modifying (or adapting) the business model (Kotarbe, 2018).

Most digitization strategies typically define current and future operational activities, the required application systems and infrastructures, and the appropriate organizational and financial framework (Teubner, 2013). These elements can be attributed to four dimensions: technology use, changes in value creation, structural

changes, and financial aspects (Matt et al., 2015). Transformation triggers internal organizational resistance (Robbins, 2008) and in order to cope with this opposition to change, leadership skills are essential (Matt et al., 2015), since greater use of digital technologies may not always necessarily enjoy the support of employees (Grover and Kohli, 2013).

In this paper, we seek to determine whether digital transformation influences talent management. We also look at whether companies are improving their strategies for attracting and retaining talent by leveraging the benefits of digital transformation (Schiemann, 2014; Hatum, 2010; Gagnon and Kurata, 2016; Promsri, 2019). In order to address the above questions, we examine whether companies are making changes to their strategies for attracting and retaining talent in order to successfully meet the new challenges posed by the digital age (Sethibe and Steyn, 2015). Digital transformation is an ongoing phenomenon that reaches beyond simply investing in technology or digitizing an organization, as it involves profound changes in the very concept of the business model, the organizational culture and the company's value chain (Kiron and Spindel, 2019). Merely implementing technology in the organization does not imply transformation, although the organization must be changed by relying on the potential of technologies (Vial, 2019).

Digital transformation is not confined to simply reducing costs (Gray and Rumpe, 2017) –due to a better use of technology or process improvement– but also involves a process of creating new business models (Osterwalder, 2009) that adapt to the new digital environment.

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A company's digital approach can have a huge impact on the nature of the job, the different types of jobs, or the way people are managed. Thus, there is a need to develop new human resource strategies for talent management in the digital age (Soule et al., 2016). Digital transformation is a process of organizational change which essentially focuses on the weight people have in this transformation (Alunni and Llambías, 2018).

The paper is structured as follows. In the following section, we develop the theoretical framework on which our study is based and formulate the hypotheses we aim to test. Subsequently, we present the methodology used and the results obtained. Finally, we present the conclusions of the work, the limitations of the study and the future lines of research.

In this context, it is not clear whether business leaders have the necessary training to handle this new business model, which leads us to consider leadership as a key factor in digital transformation. Moreover, it is not possible to ensure that traditional talent management systems are applicable in a new digital environment (Bock, 2015).

In order to increase the success of the digital transformation process, new organizational capacities are required (George et al., 2016), while leaders must first assimilate the complex implications that digitalization entails for their company and their employees (Wang et al., 2016). Digital initiative requires organizations to make strategic changes in order to improve not only the individual skills of their employees but also the coordination of people, processes, and technologies (Desmet et al., 2015; Dörner and Meffert, 2015). The changes that the organization can make as a result of the benefits afforded by new technologies must therefore be complemented by changes in organizational structures, management approaches, organizational behaviours, and operating cultures (Wade and Marchand, 2014; Kohnke, 2017).

Organizational strategies derived from digital transformation affect large areas of companies and even go beyond their borders –impacting products, business processes, sales channels, and supply chains (Berman, 2012; Barco, 2016). One of the main gaps being analysed in an attempt to explain why not all companies succeed in their digital transformation concerns their talent management (Frankiewicz and Chamorro-Premuzic, 2020).

Academia offers a vast number of studies on talent management. (Boxall et al., 2007; Scullion et al., 2010; Huang and Tansley, 2012; Tansley et al., 2012; Dries, 2013; Crane and Hartwell, 2019; Whysall et al., 2019; Claus, 2020). This paper aims to analyse what impact the external and internal context of digital transformation generates on talent management in organizations (Gallardo-Gallardo et al., 2019). Among the factors that are changing in organizations (digital transformation indicators) are: organizational culture (Bendak et al., 2020), business models (Downes and Nunes, 2013; Matt et al., 2015; Bashir and Farooq, 2018), digital leadership (Wakefield et al., 2016; Promsri, 2019), and new human resource strategies for talent management in the digital age (Meena and Parimalarani, 2019).

“More than anything else, digital transformation requires talent. In fact, putting together the right team of technology, data, and process people who can work together, with a strong leader who can drive change, may be the most important step a digital transformation company can take. Of course, even the best talent does not guarantee success. But the lack of it almost guarantees failure” (Davenport and Redman, 2020; p. 1).

The potential benefits of digitization are manifold and include increased sales or productivity, innovations in value creation, as well as new ways of interacting with customers (Berman, 2012). Business models can thus be reformed or replaced (Downes and Nunes, 2013). Without the transformation of existing companies, the economic and environmental challenges that the future holds cannot be addressed in a sustainable manner (Bican and Brem, 2020). Broadly speaking, digital transformation can be defined as the modification (or adaptation) of one's business model (Kotarbe, 2018).

Transformation causes internal organizational resistance (Robbins,

2008) and, in order to cope with this resistance, transformation leadership skills are essential and require the active involvement of the different actors affected by transformations (Matt et al., 2015), since a greater use of digital technologies may not always be desirable (Grover and Kohli, 2013). Analysing the level of digital maturity of the sample of companies selected in this project has therefore been considered a key factor, although the term “digital maturity” has been subject to different interpretations, such as that of Chanias and Hess (2016, p. 4) who refer to “the state of a company's digital transformation”.

2. Theoretical framework

In the current technological environment, numerous studies have shown a growing interest in the impact of innovation on business results (Abedrapo, 2014; Rauter et al., 2019). More specifically, the human factor is considered to be the driving force behind the development of knowledge networks (Reagans and Zuckerman, 2001). For this reason, various studies have shown how people contribute to the process of entrepreneurial innovation, since people's knowledge allows both new and existing skills to be put to use (Camelo et al., 2000; Li et al., 2006), with human resources being one of the keys to the development of knowledge and entrepreneurial innovation networks (Becerra and Alvarez, 2011).

Effective management of the business innovation process involves successfully adopting and adapting a sociotechnical systems approach to all aspects of the organization, including –critically– people and processes, as well as technology-related problems (Cormican and O'Sullivan, 2004). Furthermore, organizations are under sustained pressure to improve the efficiency and effectiveness of the HR function (Mackea and Genarib, 2019) by rethinking their approach to how employees are managed (Brewster and Larsen, 1992).

Strategic management explores which factors correlate with the success of the organization from an internal perspective. This approach is called “Resource and Capability Theory” and examines the source of the company's sustainable competitive advantages (Wernerfelt, 1984; Barney, 1991). It should be noted that, within an organization, HR can be a potential source of sustainable competitive advantage (Wright et al., 2001). Resources are generally not valuable in themselves but because they enable organizations to undertake multiple activities (Porter, 1991). Another key factor derived from the approach of the theory of resources and capacities is technology, which allows the organization's performance and competitiveness to be improved, generating new challenges and opportunities that drive organizational growth (Ynzunza Cortés et al., 2013). This technology is a capacity that helps to create technical and market knowledge and that facilitates communication between functional areas related to organizational performance (Ynzunza Cortés et al., 2013).

This integrated approach can be applied in the context of digital transformation since one of the key characteristics will be the dynamism brought about by technological developments. Strategic resources that favour innovation processes include transformational leadership (Oke et al., 2009), human capital (Leonard and Sensiper, 1998; Lawson and Samson, 2001), and culture (Naranjo-Valencia and Calderón-Hernández, 2015).

2.1. Talent management

In 1998, a group of McKinsey consultants coined the term “war for talent” and noted that talent is key to organizational excellence (Michaels et al., 2001). Since then, talent management has been seen as key to organizational success (Beechler and Woodward, 2009) and necessary for the sustenance and sustainability of organizations (Gallardo-Gallardo et al., 2015).

Since then, talent management has become an increasingly popular topic and has been studied by academics. In recent years, numerous studies have appeared dealing with this term. (Boxall et al., 2007;

Scullion et al., 2010; Dries, 2013; Thunnissen, 2016; Crane and Hartwell, 2019; Whysall et al., 2019; Claus, 2020). One group of studies advocates incorporating the effects of the organizational context on human resources, and extending the universalist approach of best practices, offering contingent alternatives, both in practice and research (Boxall et al., 2007; Thunnissen, 2016). Another group of authors state that talent management adds value to strategic human resource management (Dries, 2013; Szierbowski-Seibel and Kabst, 2017; Beraha et al., 2018; Kaufman, 2020).

There are also many definitions of talent management that refer to key concepts such as attracting, retaining, developing, and deploying talent (Scullion et al., 2010; Thunnissen, 2016). In 2013, Meyers et al. (2013) presented a compelling overview of the different perspectives on talent, the different interpretations of these perspectives, and some implications for an organization's position when designing talent management practices.

This paper aims to analyse the impact that digital transformation has on talent management in organizations (Gallardo-Gallardo et al., 2019). The reason for examining the relationship between digital transformation and talent management stems from the fact that, in the different lines of research on talent, a higher level of analysis seems necessary that refers to the influence of the organization's external and internal context (Thunnissen et al., 2013). In the current digital environment, great organizational efforts are being made to adapt to the new situation, at a time when there seems to be a shortage of talent to fill certain positions (Chambers et al., 1998; Wójcik, 2017).

Tarique and Schuler (2010) find exogenous factors that favour talent shortages (globalization, demographics, and the gap between supply and demand), as well as other endogenous factors (international strategic alliances, required skills and local strategies). Organizational managers must achieve long-term stability based on their talent management strategies in order to remain competitive in the global economy and not engage in short-term approaches that spark an economic crisis with mass layoffs (Temkin, 2008).

Intellectual capital or talent is increasingly essential to the organization's strategic success. Digitization, labour shortages, growth through acquisitions, simultaneous downsizing and expansion, demographic shifts in the workforce and globalization are just some of the trends that have made talent the top priority for organizations (Kiron and Spindel, 2019).

Thunnissen et al. (2013) propose a more critical approach, drawing attention to the economic and non-economic (i.e., social and moral) value that can be created by managing talent at three levels: individual, organizational, and social. Cappelli and Keller (2014) examine the potential implications of today's uncertain market challenges for talent management theory and practice.

The workforce is now larger, more diversified, mobile and more skilled than it was a few years ago (Briscoe et al., 2009). In this global environment, not only has the way business is conducted changed, but it has also created the need for organizations to manage their workforce in a global context (Tarique and Schuler, 2010).

Some authors consider talent management to be a "bridge field" (Sparrow et al., 2014), drawing on the strengths of HR management, supply chain management, marketing or the theory of resources and skills (Sparrow and Makram-What, 2015). To understand which elements of talent management are most valuable to organizational performance, we need to know which elements of talent management architecture have the greatest impact on organizational effectiveness. This talent management architecture is the combination of system processes and practices developed and implemented by an organization to ensure that talent management is carried out effectively (Sparrow and Makram-What, 2015).

In many studies, we find that talent management involves attracting, identifying, developing, retaining and systematically deploying talent (Scullion et al., 2010). In general, talent management aims to meet the quantitative and qualitative needs of human capital and to contribute to

the company's overall performance (Beechler and Woodward, 2009; Cappelli, 2008). It is assumed that each stakeholder in the organization shares this economic and organizational interest. Different studies on talent management thus highlight the rational and economic side of work and organizations (Thunnissen, 2016). Given the essential role of HR managers in the development, launch and monitoring of talent management systems, greater organizational commitment to talent management will increase the importance of HR professionals, making their work vital to the company.

From our point of view, context is key to explaining the value of talent. Individuals may perform better or worse depending on their immediate environment, the leadership exercised by those who run the company, and the team they work for. The importance of context in talent management has already been explored in different studies (Gallardo-Gallardo et al., 2013; Gallardo-Gallardo et al., 2019). For this reason, we believe that digital transformation is an organizational effort to adapt to this new context, and which should bring about changes in all strategic areas of the organization (Alunni and Llambías, 2018).

Collings and Mellahi (2009) note that some studies consider talent management to be a contingent practice. This leads us to the "best fit" model, which recognizes the impact of organizations' specific internal and external contexts on talent management practices and outcomes (Gallardo-Gallardo et al., 2013).

Talent management policies begin by identifying key positions in the organization, then identify people who have the potential talent to fill those key positions (Coulson-Thomas, 2012). If there is not enough talent internally, external people need to be recruited to fill potential gaps that the organization has or will have in certain positions and to develop HR policies aimed at developing, motivating and engaging talent in order to meet the organization's talent needs (Highhouse et al., 2003; Edwards, 2010). Digital transformation has different implications for organizational change (Doppler and Lauterburg, 2005). These changes require organizations to rethink HR strategies (Lund et al., 2016), especially those aimed at attracting and retaining talent.

Based on these studies, and in order to examine the influence of digital transformation on talent management, we establish the following hypothesis:

H1. The digital transformation process of organizations influences talent management.

2.2. Digital transformation

The process of digital transformation entails creating new business models and the ability to exploit new market opportunities (Catlin et al., 2015). This digital transformation involves significant investment in developing digital skills, which must be aligned with the business strategy (Lorenzo, 2016). Developing these capacities must take place comprehensively in all dimensions of the organization: strategy, people and culture, management structure and systems, business process and technology (Lorenzo, 2016).

First and foremost, digital transformation has to do with how companies respond to digital trends in the environment (Downes and Nunes, 2013; Porter and Heppelmann, 2014). Sometimes, the emergence of these trends means adapting to the way your customers, partners, employees and competitors use digital technologies (Matt et al., 2015). Second, how an organization implements technology is only a small part of digital transformation. Other issues, such as strategy, talent management, organizational structure or leadership, are as important or even more important than technology for digital transformation (Kane, 2017; Bharadwaj et al., 2013).

Digital transformation also refers to changes in business models, organizational developments and social changes (Kevles et al., 2017). Transformation is disruptive and affects not only customer relationships but also internal processes and value propositions (Westerman et al., 2012; Morakanyane et al., 2020). Digital technologies and business

innovations influence different fields: introducing new cultures, changing society, reshaping the competitive landscape, raising customer expectations, disrupting established business models, blurring lines between industries, and creating unprecedented challenges and opportunities for companies around the world. As a result, digital transformation is now one of the most important strategic issues for all organizations (Korachi and Bounabat, 2020).

Digitization seeks to transform the whole organization by redefining the value propositions for the client, the value-added processes and the ways people work. Transformation also requires strong leadership that is capable of solving problems and challenges and of understanding that technology can create large-scale improvements (Earley, 2014). Digital transformation offers a unique opportunity for HR to influence employee culture, well-being and engagement. Company digitization enhances the ability to generate competitive advantages through cost reduction, efficiency improvement or new forms of production (Fitzgerald et al., 2013).

Digital transformation strategies focus on transforming products, processes and organizational aspects due to new technologies. Digital transformation strategies go beyond the process paradigm and include changes and implications for products, services and business models in general (Matt et al., 2015). The power of a digital transformation strategy lies in its scope and objectives. Less digitally mature organizations tend to focus on individual technologies, and their strategies have an operational focus. Digital strategies in mature organizations are developed with the intention of transforming the business (Kane et al., 2017).

Companies in all industries (Westerman et al., 2014) need to evaluate their current business model against emerging opportunities and to potentially adapt it to the new digital age (Gannon, 2013). To account for this phenomenon, recent literature has established the concept of digital maturity. Although several equivalent terms have been presented in the literature –such as digital readiness or digital transformation index– we consider digital maturity to be the predominant term. Chanias and Hess (2016, p. 4) define digital maturity as “the state of a company’s digital transformation.” Digital maturity is a key construct for greater academic research, as it reflects the different levels of transformation that each organization adopts, allowing us to delve deeper into this socio-technical phenomenon (Tilson et al., 2010).

Transformation refers to a fundamental change within the organization and has a major impact on organizational strategy (Matt et al., 2015; Kotter, 1995) and the distribution of power (Wischnovsky and Damanpour, 2006). The scales employed to measure the “digital maturity index” have been used to evaluate and measure the transformation process. Maturity models are a tool that primarily allows for an assessment of the status quo (Becker et al., 2009) and indicates potential, anticipated or dynamic growth towards the desired target state (Paulk et al., 1993). The scales used to evaluate the digital maturity index in our study were chosen from among the different models proposed. We believe them to be a key element for seeing how the level of each company surveyed within the process of digital transformation has evolved. In the study by Kane et al. (2017, p. 7), “companies with an advanced level of digital maturity are characterised by implementing systemic changes in the way they organise and develop the workforce, stimulate innovation in the workplace, and cultivate digitally minded cultures and experiences.”

The Digital Maturity Index measures an organization’s ability to take advantage of and benefit from technology. It shows us how companies struggle to keep up with accelerated standards whilst also looking to the future. It seems clear that most are not prepared for what is coming, as technologies continue to merge and advance (Curran et al., 2017).

In our research model, we establish digital transformation as an independent variable. We follow the review of models to analyse whether the transformation process fits into a strategic plan. In our review, we measure the level of digital transformation using the digital maturity index (Jacquez-Hernández and López Torres, 2018). Digital maturity is a

key construct for further academic research, as knowledge about the paths taken by different organizations allows a deeper understanding of this ongoing socio-technical phenomenon (Tilson et al., 2010). While a digital strategy consolidates and aligns the ICT and business strategy, a digital transformation strategy specifically contains the vision, planning and implementation of the organizational change process (Matt et al., 2015).

In order to increase the success of the digital transformation process, new organizational capacities are required (George et al., 2016), while leaders must first assimilate the complex implications that digitalization entails for their company and their employees (Wang et al., 2016). Digital initiative requires organizations to make strategic changes in order to improve not only their employees’ individual skills but also the coordination of people, processes, and technologies (Desmet et al., 2015; Dörner and Meffert, 2015). The changes the organization can make thanks to the advantages offered by new technologies must therefore be complemented by changes in organizational structures, management approaches, organizational behaviours and operating cultures (Wade and Marchand, 2014; Kohnke, 2017).

As digitization is a challenge for organizations, “to successfully implement it, organizations must invest in staff training, empower employees, change organizational culture to embrace the key role of analytics for the company, and hire leaders who actively support digitization” (Ancarani and Di Mauro, 2018, p. 7). In light of the previous studies, we expect that the digital transformation which organizations undergo will impact talent:

H2.1. The digital transformation of organizations influences the attraction of talent.

H2.2. The digital transformation of organizations influences the retention of talent.

3. Methodology

3.1. Population and sample

The target population is made up of Spanish companies with an intermediate or advanced level of digital transformation and who belong to one of the following four sectors: industry, construction, commerce, and other services (Table 1). Due to the large size of the population, the sample is selected randomly, thereby guaranteeing its representativeness and the possibility of extrapolating the data obtained.

In the study on digital transformation in Spain prepared by the Spanish Chamber of Commerce, 35 % of companies were at an advanced stage of implementation with a specific digital transformation strategy, while 50 % were at an intermediate level.

Companies in the sample were selected using the Digital Readiness Assessment Maturity Model (DREAMY) Digital Maturity Index (De Carolis et al., 2017). The maturity scale ranges from 1 (lowest level of maturity) to 5 (highest level of maturity). We ruled out companies that did not reach level 3, as we feel they do not attain the average level of digital transformation. Sample distribution by sector is shown in Table 2.

In our sample, companies with 100 to 500 employees account for 38.2 % of the total, companies with 500 to 1000 employees account for

Table 1
Business sectors of the study.

Business sector	% Companies
Total sectors	3,152,332
Industry	7 %
Construction	13.5 %
Trade	20 %
Rest of services	59.5 %

Source National Statistical Institute of Spain (2020).

Table 2
Distribution of the sample by sector.

BUSINESS SECTOR	Frequency	%	Cumulative %
Industry	102	32.4	32.4
Construction	70	22.3	54.7
Trade	35	11.1	65.8
Rest of services	107	34.2	100.0
Total	314	100	

Source: own elaboration.

37.9 %, and companies with >1000 employees account for 23.9 %. The information needed to test the hypotheses was obtained through a questionnaire. The design and initial construction of the questionnaire was carried out in two phases: the first related to creating the items, and the second to content validation. Questionnaires were completed by a senior manager of each company (director of human resources, ICT director or director general).

3.2. Variables

3.2.1. Independent variables

In our research model, we established digital transformation as an independent variable. We measure the level of digital transformation using the digital maturity index and three indicators: business models, organizational culture, and leadership (Jacquez-Hernández and López Torres, 2018). These three indicators are the most widely used when studying the digital transformation process. In turn, to validate the model, we see whether these indicators are structurally related to digital transformation through maturity scales. The scales used to evaluate the digital maturity index are a key element in understanding the evolution of each company in the process of digital transformation.

The Digital Maturity Index measures an organization's ability to take advantage of and benefit from technology. It also indicates how companies struggle to stay up to date, as technologies continue to merge and advance (Curran et al., 2017).

For this study, among the different digital maturity models being used, we selected the following three:

1. McKinsey's Digital Ratio (Catlin et al., 2015).
2. Skills maturity model (Pauk et al., 1993).
3. Our own adaptation of the Digital Readiness Assessment Maturity Model (DREAMY, Digital Readiness Assessment Maturity model) (De Carolis et al., 2017).

3.2.2. Dependent variables

The dependent variable is the variable explained by the independent variable. In our study, we wish to know whether digital transformation (independent variable) influences talent management (dependent variable). Traditionally, talent management consists of HR practices aimed at attracting and retaining talent. In our research, we therefore choose three dependent variables: talent management –measured by a scale of HR practices– attraction, and retention.

- Talent management: a variable that integrates all activities related to the management of the life cycle of talent, from attraction to development and retention (Schiemann, 2014).

This variable is measured using the PRH-33 scale (Boada-Grau and Gil-Ripoll, 2011). This scale consists of two sub-factors:

- 1) – Development: professional growth of people within the organization, valuing aspects such as: teamwork, leadership, conciliation, change, and innovation.
- 2) – Formalization: use of processes, procedures and tools, valuing documentary aspects, business plans, and management models.

The PRH-33 scale covers the following 15 aspects of human resources: (1) values and culture, (2) job description and analysis, (3) internal communication, (4) training and development, (5) performance and performance appraisal, (6) staff selection, (7) salary compensation, (8) reception and separation processes within the company, (9) work-force planning (10) climate and motivation, (11) teamwork, (12) change management, (13) leadership style, (14) labour relations, and (15) career plans.

In this research, 28 of the 33 items that make up the scale were used in order to reduce the excess number of questions and use only those most appropriate for this research. In addition, eight items were introduced to strengthen the assessment of human resource practices vis-à-vis attracting and retaining talent.

- Attracting talent: this variable seeks to understand the recruitment efforts that organizations must make in order to develop their business properly: that is, recruiting people in a timely manner, in sufficient numbers and with the right skills to join the company when needed. This variable is measured by the following four items: type of talent needed by the company, talent attraction strategy, talent development, and talent retention.

- Retention of talent: employee loyalty to the organization is key to organizational success and long-term profitability. Companies must be sufficiently attractive such that their employees would prefer to stay rather than move to another firm. Some studies claim that employer branding reduces turnover and increases employee loyalty (Kuchеров and Zavyalova, 2012). This variable is measured using the items applied by Hillebrandt and Bjorn (2013) in their study. These items were selected from among those that make up the PRH-33 scale. In addition, we added an item on the use of e-recruitment from the study by Eckhardt et al. (2014).

3.3. Statistical analysis of data

After collecting the data from the questionnaires, the statistical processing of the questionnaires was initiated. We used version 25 of the statistical software SPSS in our study. We first calculated the variables (recoding of variables). New variables are generated by numerical transformations performed on the values of the pre-existing variables. This allows us to work on numerical scales, starting from nominal items, which facilitates statistical calculation. In turn, to test the hypotheses, we resorted to structural equations modeling, using the SmartPLS 3.2.3 program (Ringle et al., 2015).

4. Research findings

In order to test the hypotheses presented, we use a structural equations model. This model is a multivariate statistical technique that allows the effect and relationships between multiple variables to be estimated. These models enable us to test the relationship (non-causality) between observed and latent variables.

The process starts with the PLS-PM algorithm, which is an iterative process that uses standardized manifest variables. This algorithm allows us to calculate external weights, latent variable scores and loads. It is a partial procedure, as it analyses blocks one by one using simple and multiple linear regressions alternately.

The algorithm process consists of the following steps:

- 1- First step: we obtain the weights in order to find the scores of the latent variables.
- 2- Second stage: the estimation of the route coefficient is performed by making regressions between the estimated scores of the latent variables according to the system of specified structural relationships.
- 3- Third stage: obtaining the loads through correlations between latent and manifest variables.

The first step of our study is to evaluate the reliability and validity of the model used. The internal consistency indicates the reliability of the construct. We use the composite reliability index to know the reliability of the model. This index is more appropriate than Cronbach's alpha, since it does not assume that all indicators are given the same weighting (Chin and Marcoulides, 1998). Indicators are considered valid as of 0.7 (Nunnally and Bernstein, 1994). The results obtained (Table 3) show the reliability of the model.

Convergent validity indicates that a set of indicators, items or reagents represent a single underlying construct (Henseler et al., 2009). The measure used to determine the validity of the model is the average variance extracted (AVE), which measures the amount of variance of the construct that can be explained through the chosen indicators (Fornell and Larcker, 1981). If the AVE is greater than or equal to 0.50, we have convergent validity. The results obtained (Table 3) show the validity of the model.

Having completed the analysis of construct reliability and validity, the next step is to determine whether the indicators used in the model are independent of each other. In order to do this, we perform discriminant validity analysis, which we measure through the Spearman correlation.

Carmines and Zeller (1979) consider there to be discriminant validity with factor loads >0.707. It is suggested that indicators with loads below this range should be eliminated (Urbach and Ahlemann, 2010; Hair et al., 2011). Table 4 shows the Spearman correlation values. All values are >0.8, except for digital transformation, which is above 0.75. We consider that this latter data shows a positive relationship close to the limit. We therefore consider it proven that there is discriminant validity in the model.

Through the reliability of the latent construct or variable, we can observe the consistency of its indicators; that is, the simple correlations of the measures or indicators with their respective constructs, valued by examining factor loads or weights. Carmines and Zeller (1979) consider factor loads >0.707 to be appropriate. It is therefore suggested that indicators with loads below this range should be removed (Hair et al., 2011). When an indicator has a lower than the denoted load, it can be removed and the model can be run again to estimate the results (Urbach and Ahlemann, 2010). In the PLS algorithm, composite reliability is >0.8 in all cases. Authors recommend using a compound validity >0.7 as a reference (Hair et al., 2011; Malhotra, 2004). As for the value of the extracted variance, all values are above 0.5, indicating that the factors are valid at the convergent level.

The classic criterion used is that of Fornell and Larcker (1981), who recommend that the square root of the average variance extracted (AVE) should be greater than the correlations that present a construct with the rest of the constructs. When the square root is higher in all cases, it is assumed that the model is valid in a discriminating way.

Once the analyses carried out have validated the consistency and validity of our model, we then proceed to test the hypotheses. To do this, we must perform the PLS-SEM analysis without the moderating effect. A PLS path model without the moderating effect includes only the main effects among the latent variables in the structural model. The main effects model becomes a moderator model after including a product term and its interaction (or moderation) effect. In a moderator model, the main effects change to simple (or single) effects (Henseler and Fassott,

2010).

Whereas a main effect quantifies the change in the level of the dependent variable when the considered independent variable is increased by one unit and all other independent variables remain constant (ceteris paribus), a simple effect quantifies the change in the level of the dependent variable when the independent variable is increased by one unit, the interacting variable has a value of zero and all other independent variables remain constant. The first step is to analyse the relationship between the independent variable and the three dependent variables. We perform a simple regression analysis with which to obtain the path coefficients.

These coefficients have standardized values between +1 and - 1; the higher the value, the greater the ratio (prediction) between the values; while the closer to zero, the lower the ratio. If the result of a path value is contrary to the sign postulated in the hypothesis, it indicates the hypothesis will be rejected. The results obtained (Table 5) show significant and moderate relationships between the independent variable and the three dependent variables.

We then analyse the validity of the analysis model (goodness of fit of the model) using the coefficient of determination R², which calculates a linear regression between the variables of the model. Falk and Miller (1992) consider that an R² should have a minimum value of 0.10; Chin and Marcoulides (1998) consider 0.67, 0.33, and 0.10 (substantial, moderate, and weak), while Hair et al. (2017) recommend 0.75, 0.50, 0.25 (substantial, moderate, and weak).

The results obtained (Table 6) are moderate, although all factors are above 0.20. In this analysis, we found the R² for attracting talent and managing talent to be substantial, retention of talent to be moderate, and digital transformation to be weak. All are above 0.20, thereby validating the equation when the variance is explained by at least 20 %.

Using the f² distribution, we then analyse the effect of digital maturity on the three dependent variables. This measure is a continuous probability distribution that measures changes in R². A value of 0.03 represents a low f effect, a value of 0.15 represents a medium effect, and 0.35 a high effect. A low f effect means little probability of a relationship between the digital transformation variable and the three dependent variables.

All the effects of the variable “digital transformation” are average and range from 0.15 to 0.35 (Table 7). They can therefore be considered valid.

Since the PLS distribution is unknown, conventional significance cannot be tested. In other words, because there is no normality of the sample, conventional parametric tests are not applied. The bootstrapping technique analyses the robustness of the indicator loads and whether the relationships between the variables are significant. By calculating the distribution of the subsamples, we obtain their standard error, which will be used to calculate Student's t, according to the formula $t = b/Sb$, where b is the path coefficient and Sb is the type error. The result is Student's t, which is significant for values of 1.96 (0.05) and 2.58 (0.01) (Hair et al., 2017).

All factors have a $T > 1.96$ and $P < 0.005$ (Table 8). Using bootstrapping analysis, we thus demonstrate that the three hypotheses of our research are statistically significant, through Student's t-values.

The three hypotheses of our study are therefore tested and accepted.

5. Conclusion and practical implications

The results contribute to a better understanding of the impact of digital transformation on talent management, attraction, and retention. Numerous studies on talent management carried out in recent years show the enormous interest in the scientific community with regard to what role people play in organizations, particularly in the digital environment in which companies operate today. If anything characterizes HR in the digital age, it is the ability to transform data into valuable knowledge (Bondarouk and Brewster, 2016). There are many direct costs involved in the rotation of talent, such as recruitment and training

Table 3
Reliability and construct validity analysis.

Reliability and construct validity	Composite Reliability Index	Average Variance Extracted (AVE)
Digital maturity	0.797	0.576
Talent attraction	0.962	0.926
Talent management	0.965	0.932
Talent retention	0.748	0.525

Source: own elaboration.

Table 4
Discriminant validity analysis.

Discriminant validity	Digital Transformation	Talent Attraction	Talent Management	Talent Retention
Digital Transformation	0.759			
Talent Attraction	0.758	0.905		
Talent Management	0.573	0.862	0.965	
Talent Retention	0.600	0.811	0.765	0.809

Source: own elaboration.

Table 5
Path coefficient analysis.

Coefficient Path	Talent Attraction	Talent Management	Talent Retention
Digital Transformation	0.556	0.613	0.624

Source: own elaboration.

Table 6
Coefficient of determination analysis.

Coefficient of determination	R ²	R ² adjusted
Attraction of talent	0.642	0.635
Talent management	0.642	0.635
Retention of talent	0.547	0.538

Source: own elaboration.

Table 7
Distribution analysis f².

Coefficient f ²	Attraction of talent	Talent management	Retention of talent
Digital maturity	0.184	0.267	0.377

Source: own elaboration.

Table 8
T statistics T (Bootstrapping).

T statistics (Bootstrapping)	Original Sample	Sample mean	Standard deviation	T statistics	P Values
Digital- Maturity> Attraction of talent	0.234	0.241	0.086	1.998	0.047
Digital- Maturity> Talent management	0.200	0.199	0.112	2.664	0.008
Digital- Maturity> Retention of talent	0.530	0.506	0.134	3.960	0.000

Source: own elaboration.

of new entrants. Yet this also carries hidden costs such as lost productivity, the learning curve or the negative impact on the employer’s reputation.

The pandemic caused by the coronavirus has dramatically increased the use of digital tools in jobs, such that we believe that exploring the influence of digital transformation on talent management is very attractive because of its topicality. Digital development is changing the way organizations select and retain new employees, and this study shows the positive relationship between digital transformation and talent management. Talent management has become a strategic asset that generates innovation, consumer value and financial profitability. Attracting and retaining talent is therefore key for organizations. In the literature review, we found evidence on how, in the current digital context, technological advances are being taken advantage of to improve talent management. In the midst of the race to digital maturity,

this poses a high risk of not achieving transformation success due to scarce resources and skills. In short, digital work platforms –arising from Big Data– enhance the performance of HR departments in terms of talent management (Larkin and Hystad, 2017). Using this type of platform improves performance by 9 % and reduces costs by 7 %, thereby providing a better balance between supply and demand in the digital age (Lund et al., 2016). This improves the performance of employers when managing talent and facilitates more engaged, satisfied, and efficient employees as they progress in their careers (Larkin and Hystad, 2017).

These advances are taking place within a framework of continuous innovation that leads companies to update their organizational culture towards a more pioneering model. New working methods are facilitating the achievement of competitive advantages that are sustainable over time. The hypotheses tested in our empirical study show a positive correlation between the dependent variables (management, attraction, and engagement of talent) and the independent variable (digital transformation); in other words, the positive impact of digital transformation on the management, attraction, and retention of talent. We therefore accept the three hypotheses put forward in our research.

The theoretical framework within which our research is carried out indicates that talent determines the strategy to be followed by the organization, whether it is for person to position suitability, maintaining a succession policy in key positions, or for other company needs (Gallardo-Gallardo et al., 2013). Organizational change is now based on technological development aimed at adapting to a new environment that requires a restructuring of key business processes.

All of these changes -focused on technological development and the need to possess highly technical skills such as data analysis, engineering, etc., mean that companies will fail to meet 100 % of their needs in terms of talent (Tito and Serrano, 2016). Competition will therefore be disproportionate and strategies for attracting and retaining talent (Pauwe and Boselie, 2007) will have to be increasingly proactive and better than those of competing firms. Efforts will need to be made in HR policies (Sparrow et al., 2013), such as promoting careers, compensation and benefits, labour flexibility, temporary hiring in accordance with the labour regulations of each country, international hiring on the same terms as the above, etc. (Vaiman and Collings, 2013).

5.1. Contribution to corporate management

In the theoretical framework, we pointed out that merely investing in technology is not digital transformation. Our main contribution to the business world is that digital transformation is a management change process based on technologies such as big data, artificial intelligence or HR analytics, which make it easier for business models to transform (Downes and Nunes, 2013). Digital transformation is not just about cutting costs, but also about making it easier to create business models that generate greater differentiation, based on digitalization. Human resources departments need to adapt talent management processes to the new environment, as in many cases they were designed for a non-digital world (Kane et al., 2017). The digital transformation of businesses brings with it new ways of retaining, attracting and motivating people. These changes affect both the organizational culture and the way new business models are created. Thanks to new technologies, people become strategic assets of their organizations.

Starting from the premise that digital transformation offers new

opportunities to gain new and better competitive advantages, in addition to considering people to be at the centre of this digital revolution, HR departments must take a step forward to lead this internal transformative process (Lal, 2015). We agree with the “New Global Trends in Human Capital 2018 (Deloitte University Press)” report (Abbatiello et al., 2018), in that the most innovative companies are generating new talent practices, which include improving and simplifying the work experience or designing thinking and behavioural economics, which they call the “Digital HR” approach.

5.2. Limitations of the empirical study

The first limitation of the study stems from the instrument used for data collection; a hand-delivered survey. This method is directly dependent on the company's willingness to complete the questionnaire. A second limitation concerns two of the main terms used: digital transformation and talent. In both cases, they are concepts used with different meanings by the scientific community. Thirdly, this study was carried out with a sample of companies from different sectors, in order to reduce bias, although the volume of cases analysed always leads us to consider the results with some degree of caution. In an effort to reduce this limitation, we unified the criteria for selecting companies from the final sample, based on their degree of digital maturity, eliminating companies with a low level of digitalization. Fourthly, the variance of the common method has been applied so as to minimize the use of the Structural Equation Method (PLS SEM) which, as already mentioned, is more powerful than correlational models and relaxes the rigidity of regression models. Despite these limitations, the assumptions of the model were tested and accepted, such that the results of the project can be considered valid.

5.3. Future lines of research

The findings of this study lead us to suggest different lines of research for both the scientific community and companies. These proposed lines relate to different aspects of our work. First, the concept of talent needs to be further developed, as it seems to be key to reducing ambiguities. Secondly, it would be advisable to separate the attraction and retention of talent into different lines of research. In this way, it may be easier to find strategies that are more specific to each of them. Thirdly, it would be advisable to conduct research to show whether proper talent management favours the digital transformation process and, in contrast, whether poor management might slow it down.

Finally, a study could be carried out on companies which are addressing their digital transformation process, analysing whether there is a digitally-focused management change (operating processes, technology, sales channels, etc.) or whether they also include people as a key factor in this change.

CRedit authorship contribution statement

Ignacio Danvila-del-Valle: Conceptualization, Formal analysis, Investigation, Project administration, Supervision, Validation, Writing – review & editing. **Mariano Méndez Suárez:** Formal analysis, Investigation, Resources, Supervision, Writing – review & editing.

Declaration of Competing Interest

None.

Data availability

No data was used for the research described in the article.

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